The American Journal of Surgery 220 (2020) 20–26

Contents lists available at ScienceDirect

The American Journal of Surgery

journal homepage: www.americanjournalofsurgery.com

Representation of women in speaking roles at surgical conferences

Katherine M. Gerull [a, 1], Brandon Malik Wahba [a, 1], Laurel M. Goldin [a], Jared McAllister [a], Andrew Wright [b], Amalia Cochran [c], Arghavan Salles [a, *]

[a] Washington University in St. Louis, Department of Surgery, St. Louis, MO, United States
[b] University of Washington, Department of Surgery, Seattle, WA, United States
[c] The Ohio State University, Department of Surgery, Columbus, OH, United States

ARTICLE INFO

Article history:
Received 28 April 2019
Received in revised form
27 August 2019
Accepted 8 September 2019

Keywords:
Diversity
Gender
Surgery
Representation
Bias
Disparity

ABSTRACT

Background: There are a number of factors that may hinder women's surgical careers. Here, we focus on one possible factor: the representation of women at surgical conferences.
Methods: Using a purposive sample of 16 national surgical societies, we assessed the proportion of women speakers at each society's annual meeting in plenary speaker and session speaker (panelist and moderator) roles in 2011 and 2016.
Results: Overall, 23.8% (28,591/120,351) of all society members were women. Of the 129 plenary speakers, 19.4% (n = 25) were women. Twelve conferences (42.9%) had zero women as plenary speakers. Of the 5,161 session speakers, 1,120 (21.7%) were women. Three-hundred fifty-three (39.5%) of the 893 panels included only male speakers. The proportion of women on conference organizing committees was positively correlated with having women session speakers (r = 0.71, p=<0.001)
Conclusions: There is underrepresentation of women as conference speakers, particularly in plenary roles. There was wide variability in the representation of women across conferences.

Introduction

Academic medical centers, along with other organizations, increasingly recognize the importance of diversity and inclusivity.[1,2] Nevertheless, for complex reasons that are not fully understood, women in academic surgery have not yet achieved parity. One possible explanation for the increase in disparities found at higher levels within organizations, known as the "pipeline problem," suggests that the drop-off in diversity is due to low numbers of qualified candidates who are women rather than insufficient promotion and representation. A counterargument to this theory is that women have essentially reached gender parity at medical schools for the last 20 years.[3] Yet women represent only 38.4% of general surgery residents, 26.8% of assistant professors in surgery, and only 10.4% of full professors in surgery.[4–6] These data suggest that rather than a lack of influx of talented women, there is instead an efflux: the surgical talent pipeline is leaky. The notion of a leaky pipeline is further supported by data showing that the number of women achieving full professorship is not keeping pace with the increase in surgical residents who are women.[7]

One important opportunity for both visibility and career development is the invitation to speak at a conference. These opportunities are critical because appointment and promotions committees use speaker invitations as evidence of regional and national recognition.[8] However, multiple studies show women are underrepresented among speakers at conferences, both within medicine[9,10] and in other science, technology, engineering, and math fields.[11,12] Beyond formal academic work, other groups have started blogs,[13–15] bias calculators,[16] and petitions[17–19] with the goal of creating more balanced gender representation at conferences. In a time when many academic departments and training programs are making substantial diversity and inclusion efforts,[20–22] there are few such documented efforts among academic professional societies. One notable example showcasing the importance of reporting diversity and inclusion data has been in the American Academy of Physical Medicine and Rehabilitation. In this society over the past 48 years, award recipients have overwhelmingly been men (84.1%).[23] One year after data outlining this disparity were published, 5 of 8 (62.5%) of their award winners were women.[24]

* Corresponding author. Washington University School of Medicine, 4901 S Euclid Ave, Suite 920, St. Louis, MO, 63108, United States.
E-mail address: arghavan@alumni.stanford.edu (A. Salles).
[1] these authors contributed equally to this work.

https://doi.org/10.1016/j.amjsurg.2019.09.004
0002-9610/

The first step to achieving proportional representation of women at conferences is to assess the current rates of representation.[25] Inspired by a group of neurologists who began tracking the representation of women at various neurological conferences in 2015,[14] we have three aims: 1) to assess the representation of women in major speaking categories at national surgical conferences, 2) to examine the relationship between the gender makeup of conference program committees and leadership and the representation of women at annual meetings, and 3) to assess whether representation has changed over time.

Materials & methods

Membership data

We solicited membership data for 2011 and 2016 from 16 national surgical societies: the American Society of Colon and Rectal Surgeons, the American Association for the Surgery of Trauma, the American Association for Thoracic Surgery, the American College of Surgeons, the American Pediatric Surgical Association, the American Society of Breast Surgeons, the American Society for Metabolic and Bariatric Surgery, the American Surgical Association, the Association of Academic Surgeons, the Association for Surgical Education, Eastern Association for the Surgery of Trauma, the Society of American Gastrointestinal and Endoscopic Surgeons, the Society of Black Academic Surgeons, the Society for Surgery of the Alimentary Tract, the Society of Surgical Oncology, and the Society of University Surgeons. These societies were chosen to represent major subspecialties within general surgery as well as the major overarching societies (e.g., American College of Surgeons, Society of University Surgeons).

Societies voluntarily provided either aggregate data on the gender of active members or a list of members' names. Where aggregate data were not available, lists of names were coded, tabulated, and verified by a member of the research team. For each society, we calculated the proportion of women members by dividing the number of women by the number of total members in each of the two years (2011 and 2016). 2011 and 2016 were chosen as the timepoints for this study to assess change over time while being able to reliably find conference programs online.

Throughout this study, gender was determined based on traditional naming conventions (e.g., John was assumed to be a man). If the gender was not readily discernible, a web search of the full name and institution was performed, including departmental webpages and other sites, until confirmation of the gender could be found. This work was deemed non-human subjects research by the IRB at Washington University in St. Louis.

Plenary and session speakers

For the same years, 2011 and 2016, we examined the annual conference proceedings for each society to identify the gender of invited speakers. Invited speakers included any presenters or lecturers, regardless of membership in the society, who were *not* presenting peer-reviewed scientific abstracts or posters. In other words, we did not include speakers who had been selected through peer-reviews of abstract submissions.

There were two invited speaker categories: plenary speakers and session speakers. The plenary category was kept distinct to reflect the higher level of prestige associated with plenary speaking roles. Plenary sessions were defined by the societies themselves and included named lectureships and keynote addresses.

The session speaker category included moderators, panelists, and lunch-time speakers. For both plenary and session speaker categories, we calculated the proportion of speakers who were women by adding up the total number of women speakers in that category and dividing by the total number of speaking opportunities in that category for that conference. Individual speakers speaking more than once during the conference were counted each time they spoke.

For each society and in each year (2011 and 2016), we determined whether the proportion of invited women speakers differed from the proportion of women members using chi-squared tests or Fisher's exact tests as appropriate (SAS Version 9.4, SAS Institute, Cary, NC). We then recorded the percentage point difference (pp difference) between these two proportions (% women in the membership and % women in either plenary or session speaker roles) for each conference, with positive values meaning that the proportion of women in a given speaking category was greater than the proportion of members who were women that year.

All-male sessions

We identified the number of "all-male sessions" at each meeting in 2011 and 2016. An all-male session was defined as a session in which there were two or more speakers, all of whom were men.

Program committee and society leadership

Additionally, we ascertained the gender composition of the program committee and the leadership (President, Vice President, etc.) for each organization's 2011 and 2016 conferences. The lists of program committee members and leaders came directly from the society, from the conference program, or from a listing online. We report the gender makeup of the program committee and leadership for the preceding year in each case (e.g., we report data for the 2010–2011 planning committee and leadership for the 2011 meeting). We also calculated risk ratios to assess likelihood of having women speakers based on the gender of the program chair.

Correlation analysis was performed to investigate the relationship between the gender make-up of the conference program committee and the gender makeup of that conference's plenary speakers, session speakers, and the proportion of all-male panels. This analysis was repeated for society leadership.

Change over time

In order to assess change over time, chi-squared tests or Fisher's exact tests, as appropriate, were used to compare the proportion of women in plenary speaking roles, the proportion of women in session speaking roles, the proportion of all-male sessions, and the proportion of women on the program committees between 2011 and 2016 for each society. Alpha was set to 0.05 for all tests.

De-identification

Each society was de-identified and assigned a letter. All data is reported as proportions so that societies cannot be identified based on the size of their meeting or membership base.

Results

As shown in Fig. 1, examining 16 surgical societies' conference data for two years, 2011 and 2016, yielded results from 14 societies and 28 surgical conferences. Two societies were excluded from our analysis due to hosting a joint conference with insufficient data on each society's membership. For 7 out of the remaining 28 conferences, there were no membership data available for that society and year, leaving 21 conferences for which we could compare the proportion of women in the membership to the proportion of

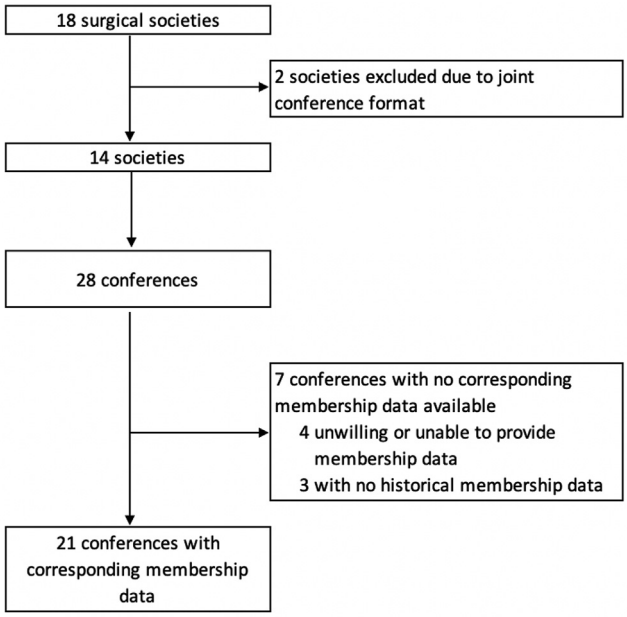

Fig. 1. PRISMA flow diagram showing conference and society membership data obtained for this study.

invited speakers at the annual meeting. Membership data were not available if societies did not track gender and were unwilling or unable to provide membership lists (accounting for loss of data related to 4 conferences). In some cases, societies did not maintain historical membership lists and could only provide 2016 data (accounting for loss of data for 3 conferences). Overall, 23.8% (28,591/120,351) of members in the examined surgical societies were women.

Plenary speakers

In both 2011 and 2016, there were conferences with *zero* women plenary speakers. Among plenary speakers for all conferences studied (n = 129), 19.4% were women. Fig. 2 shows the proportion of women in plenary speaking roles at each conference. Twelve of the 28 (42.9%) conferences had *zero* women as plenary speakers. Four out of 14 (28.5%) societies had zero women as plenary speakers in both 2011 and 2016, despite non-zero rates of women members.

As seen in Table 1, aside from a statistically significant overrepresentation of women in plenary speaking roles for society G in 2016 (pp difference = +54.5%, p = 0.004), there are no other statistically significant differences between the proportion of women plenary speakers and the proportion of women members for any society in either year.

Session speakers

As shown in Fig. 3, in both years there were conferences with *zero* women session speakers. Overall, 1,120 of the 5,161 session speakers were women (21.7%).

As shown in Table 1, when compared to society membership in 2011, there was statistically significant underrepresentation of women in the session speaker category in Society F (pp difference = −4.0%, p = 0.03). There was no statistically significant difference between the proportion of women session speakers and the proportion of women members for any of the other societies in 2011.

When compared to society membership in 2016, there was statistically significant overrepresentation of women in the session speaker category in 2016 for Societies D and L (pp difference = +10.9%, p=<0.001 and pp difference = +6.0%, p = 0.01, respectively). There was no statistically significant difference between the proportion of women session speakers and the proportion of women members for any of the other societies in either year.

All-male panels

All-male panels were found in all but 4 of 27 conferences (one conference had no panels). Of all 893 panels studied, 353 were all-male panels (39.5%). Fig. 4 shows the proportion of all-male panels at each conference.

Program committee and society leadership

Fig. 5 shows the gender makeup of program committees and society leadership. Of all 686 program committee members identified, 147 of the program committee members were women (21.4%). Of 295 society leaders, 21.7% (n = 64) were women.

Of 28 program committee chairs, 25.0% were women (n = 7). Gender of the program chair was not significantly associated with the proportion of female plenary speakers (Risk Ratio = 1.34, 95% CI = 0.65–2.72, p = 0.43) but was significantly associated with the proportion of female session speakers (Risk Ratio = 1.43, 95% CI = 1.28–1.59, p=<0.0001).

While the percentage of women on the program committee was not associated with the representation of women in plenary speaking roles (r = 0.26, p = 0.18), it was significantly positively associated with female session speakers (r = 0.71, p=<0.001) and significantly negatively associated with all-male panels (r = −0.51, p = 0.006). The percentage of women in society leadership roles was significantly positively correlated with women in plenary and session speaking roles (r = 0.57, p = 0.001 and r = 0.72, p=<0.001, respectively) and significantly negatively correlated with all-male panels (r = −0.55, p = 0.003).

Change over time

Table 1 shows that there was no significant difference in the proportion of women in plenary speaking roles between 2011 and 2016. However, there was a significant increase in the proportion of women as session speakers between 2011 and 2016 for societies A, F, and J (pp difference = +5.5, p = 0.007; pp difference = +10.4, p < 0.0001; pp difference = +19.1, p = 0.008, respectively).

Table 2 shows that when compared to the proportions of all-male panels at 2011 conferences, societies A, F, and J significantly reduced the proportion of all-male panels at their 2016 conferences (pp difference = −14.6%, p = 0.005; pp difference = −17.9%, p = 0.03; pp difference = −28.6%, p = 0.03, respectively). No societies had a significant increase in the proportion of all-male panels between 2011 and 2016. Table 2 also shows that no societies had a significant increase in the proportion of women on the program committee or in society leadership roles between 2011 and 2016.

Discussion

Our study is the first to examine the representation of women in speaking roles at surgical conferences over time. There are three main findings from this work: 1) the proportion of women in plenary speaking roles was variable, with some organizations having no women in plenary speaking roles in either 2011 or 2016 or in both years; 2) the proportion of women on program committees and in society leadership roles were both positively associated with

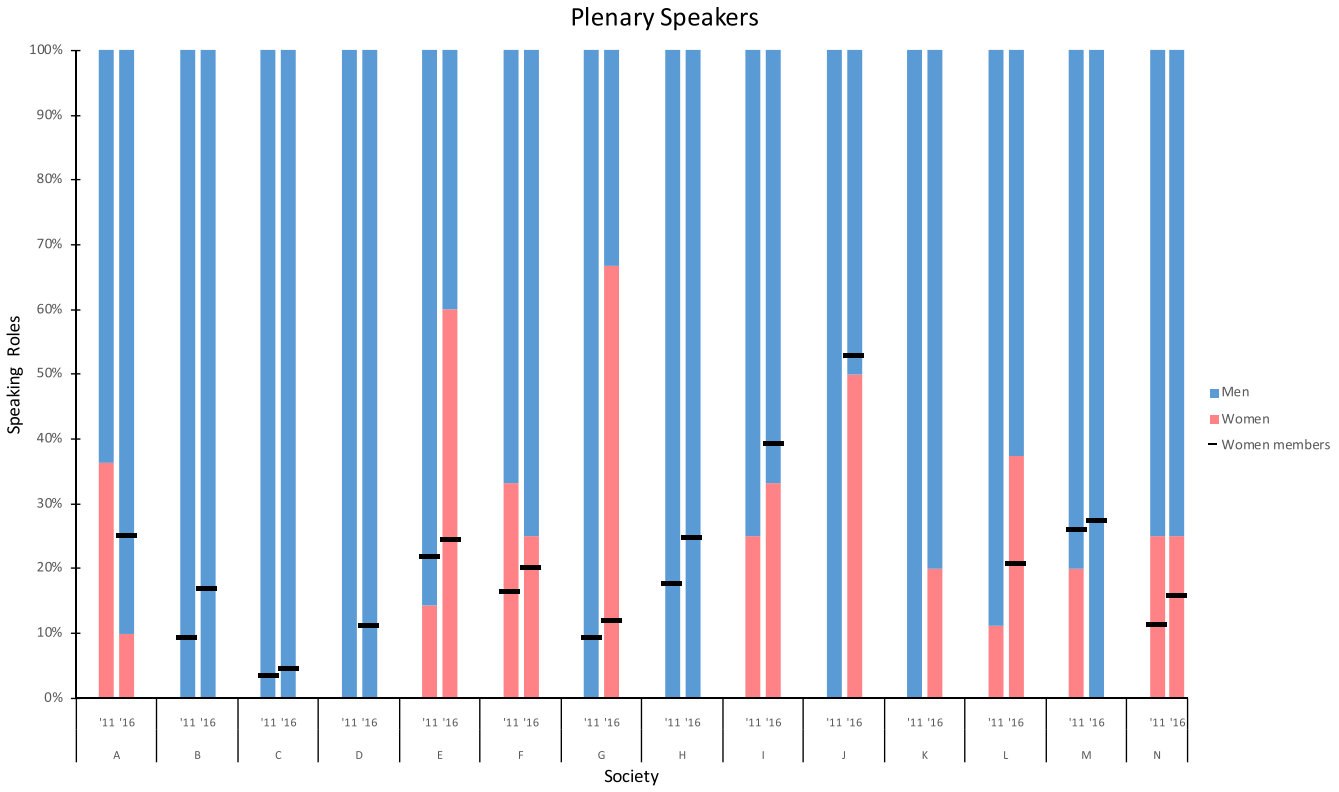

Fig. 2. Gender breakdown of plenary speakers and society membership for surgical societies in 2011 and 2016. Bars show percentage of women and men in plenary speaking roles for each society in each year. Black horizontal lines represent percentage women in society membership. Missing black lines represent the lack of membership data from the society.

having women in session speaker roles and negatively associated with all-male panels; 3) there may be increasing representation of women in session speaker roles in a few surgical society meetings over time.

Just as there are fewer women surgeons at higher academic ranks, there are also fewer women with more prestigious speaking opportunities. Although our comparison of women in plenary roles compared to corresponding membership did not reach statistical significance, this likely reflects the small number of plenary talks rather than being a practically insignificant finding. When there are only a handful of these talks, finding statistical differences can be difficult. Nevertheless, twelve of the 28 conferences (42.9%) had *zero* women as plenary speakers. A complete absence of women as plenary speakers may indicate the presence or persistence of an underlying inequity within a society. This hypothesis aligns with the analysis by Silver et al. of the gender distribution of award recipients in eleven medical and surgical societies over 72 years, which found several organizations with zero recipients who were women. Their work suggests that conspicuous disparities such as these should prompt investigation, as they may reflect a disparity

Table 1
Proportion of women in speaking roles compared to proportion of women society members and change over time.

	% Women Membership		% Women Plenary Speakers (pp difference)[a]			% Women Session Speakers (pp difference)[a]		
	2011	2016	2011	2016	Change 2016–2011	2011	2016	Change 2016–2011
Society A	[b]	25.0	36.4	10.0 (−15.0)	−26.4	22.4	27.9 (+2.9)	+5.5*
Society B	9.4	16.9	0.0 (−9.4)	0.0 (−16.9)	0	0.0 (−9.4)	0.0 (−16.9)	0
Society C	3.5	4.5	0.0 (−3.5)	0.0 (−4.5)	0	3.8 (+0.3)	3.6 (−0.9)	−0.2
Society D	[b]	11.2	0.0	0.0 (−11.2)	0	16.4	22.1 (+10.9)*	+5.7
Society E	21.8	24.3	14.3 (−7.5)	60.0 (+35.7)	+45.7	25.0 (+3.2)	32.4 (+8.1)	+7.4
Society F	16.4	20.3	33.3 (16.9)	25.0 (+4.7)	−8.3	12.4 (−4.0) *	22.8 (+2.5)	+10.4*
Society G	9.2	12.2	0.0 (−9.2)	66.7 (+54.5)*	+66.7	16.7 (+7.5)	17.9 (+5.7)	+1.2
Society H	17.7	24.8	0.0 (−17.7)	0.0 (−24.8)	0	24.3 (+6.6)	27.3 (+2.5)	+3.0
Society I	[b]	39.3	25.0	33.3 (−6.0)	+8.3	46.2	37.5 (−1.8)	−8.7
Society J	[b]	52.9	0.0	50.0 (−2.9)	+50.0	27.6	46.7 (−6.2)	+19.1*
Society K	[b]	[b]	0.0	20.0	+20.0	28.6	16.7	−11.9
Society L	[b]	20.8	11.1	37.5 (+16.7)	+26.4	21.7	26.8 (+6.0)*	+5.1
Society M	26.1	27.3	20.0 (−6.1)	0.0 (−27.3)	−20.0	22.3 (−3.8)	23.1 (−4.2)	+0.8
Society N	11.5	15.8	25.0 (+13.5)	25.0 (+9.2)	0	17.2 (+5.7)	17.8 (+2.0)	+0.6

*$p < 0.05$, p-value is calculated comparing the proportion of women in the membership to the proportion of women speakers.
[a] pp difference calculated by subtracting the percent of women members from the percent of women speakers. Positive values mean there are more women in speaking roles than the proportion of women members.
[b] Data not available from society.

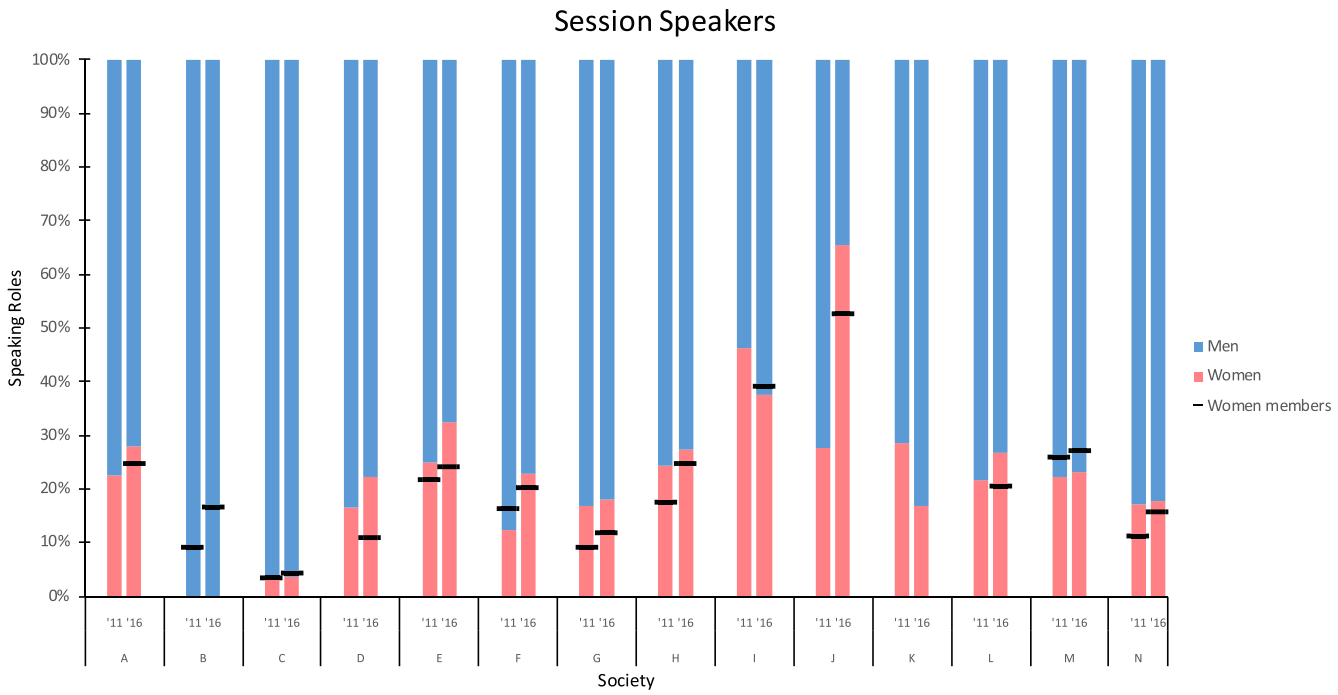

Fig. 3. Gender breakdown of session speakers and society membership for surgical societies in 2011 and 2016. Bars show percentage of women and men in session speaking roles for each society in each year. Black horizontal lines represent percentage women in society membership. Missing black lines represent the lack of membership data from the society.

in institutional support.[26] Since there are far fewer senior women than men, it is perhaps not surprising that so few women are giving plenary talks. The sponsorship gap between men and women may be part of the explanation as well, and improved sponsorship of women may be one way to close the gap.[27]

The lack of women in speaker roles may have significant implications for future generations as it may signal to women that they do not belong. Similar to our analysis of plenary speaker roles, many of our comparisons of women in session speaking roles when compared to society membership did not reach statistical

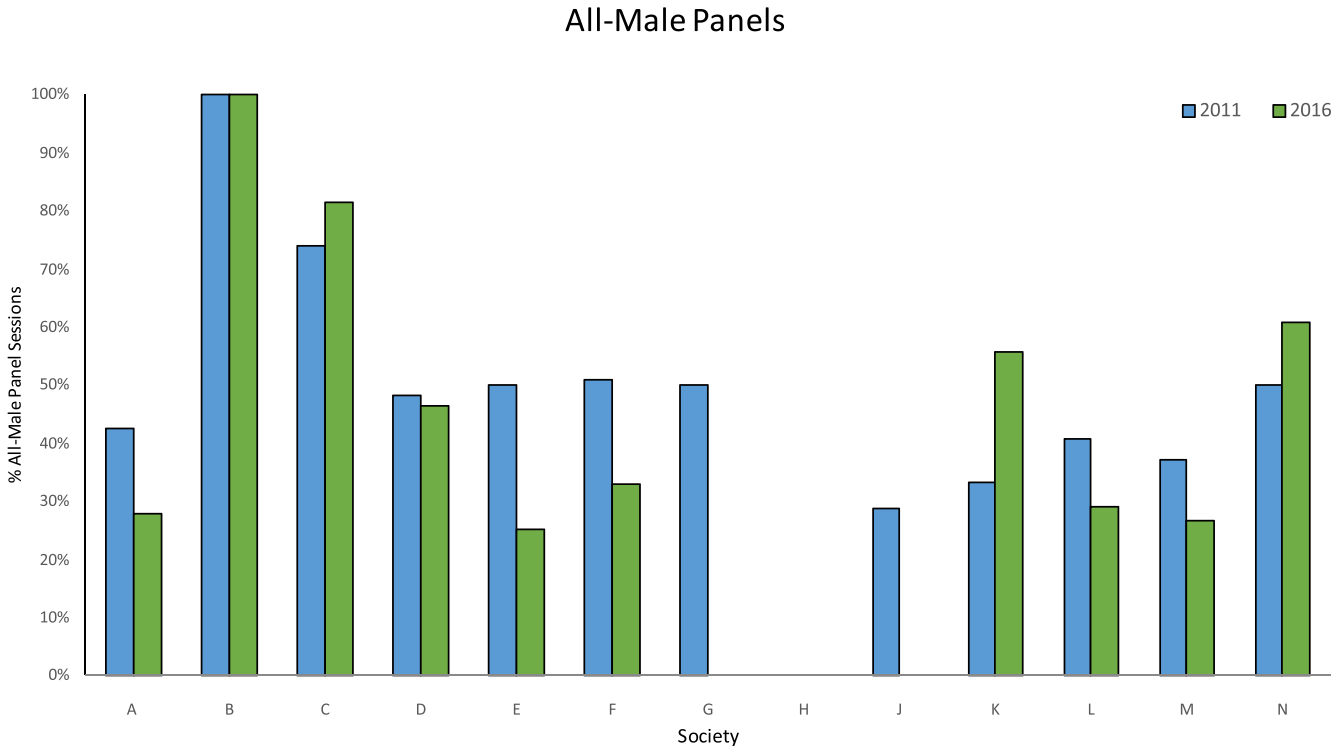

Fig. 4. All-male panel sessions at surgical society annual meetings in 2011 and 2016. Bars show percentage of all panels that were all-male in each of the two years. Where there are no bars, there were no all-male panels.

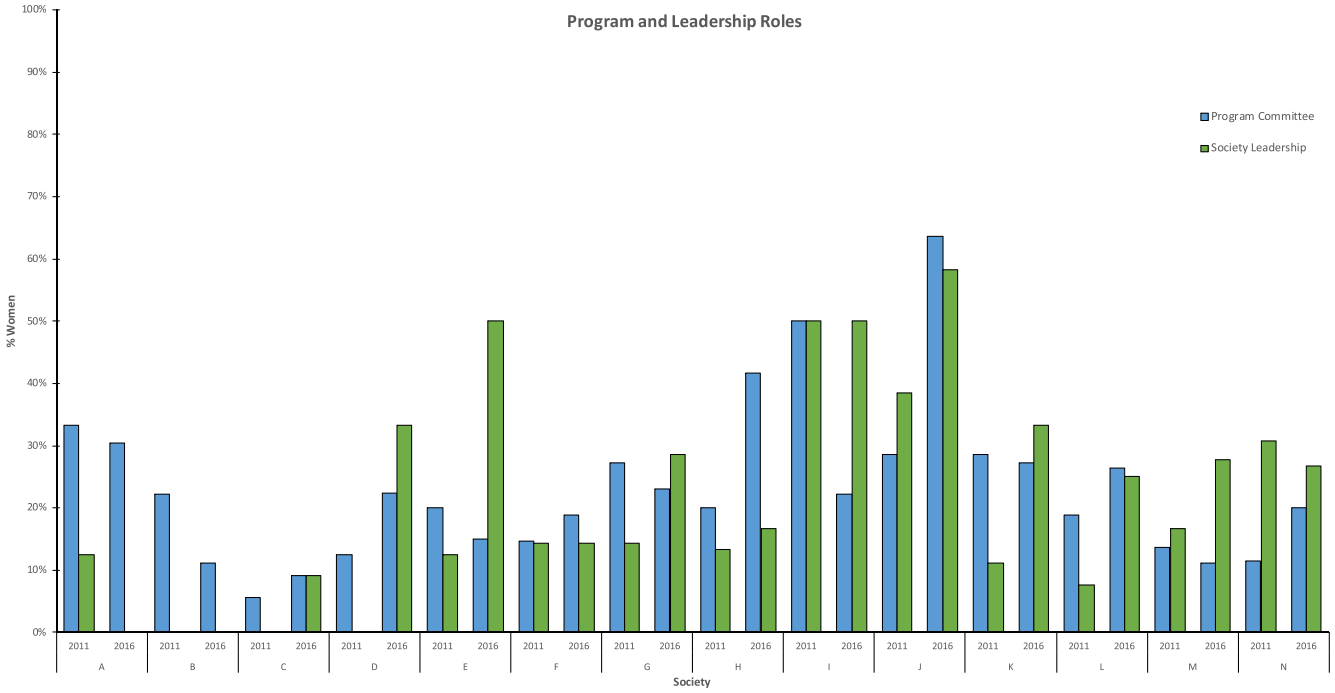

Fig. 5. Gender breakdown of program committees and society leadership for surgical societies in 2011 and 2016. Bars show percentage of women on the program committee and society leadership for each year. Where there are no bars, there were zero women.

significance. Nonetheless increasing visibility, perhaps with more women speakers, could change the implicit signals that women do not belong. Prior studies suggest that the perceived climate of an organization may contribute to the lack of women in academic surgery.[28] Thus, the visibility and advancement of successful faculty who are women are crucial to promoting diversity, especially in specialties traditionally dominated by men.[29] Since promotion depends in part on proving a national reputation, providing more opportunities for women to speak at conferences may be one way to increase the number of women in senior positions. This, then, may increase the likelihood of trainees to choose and persist in surgery.

Some societies, such as Society B, had no change in the representation of women in plenary roles or the percentage of manels from 2011 to 2016. Other societies, such as society J, increased the number of women in the program committee and represented women equally among speakers. This variability suggests that intentional efforts at diversifying representation across societies may not be uniform. In addition, some societies are more selective than others, which may skew their membership and therefore their pool of potential speakers.

There are several strategies societies can use to be more inclusive. For example, the gender diversity of speakers has been shown to increase with greater representation of women on conference organizing committees in several scientific disciplines.[9,30,31] These data suggest the importance of tracking equity within organizations. Our study is the first to demonstrate this correlation in the field of surgery. We would encourage societies to increase the representation of women on program committees and leadership, with the goal of generating greater diversity in conference programming. It is also important to consider that increased numbers of women on program committees may not directly lead to increased numbers of women speakers, but rather, it could be that both of these outcomes occur in societies that generally value the

Table 2
Comparison of all-male panels and conference organizer makeup between 2011 and 2016 conferences.

	All-Male Panels % Change	Women in Program Committee Roles % Change	Women in Leadership Roles % Change
Society A	−14.6*	−2.9	−12.5
Society B	0	−11.1	0
Society C	+7.4	+9.1	+9.1
Society D	−1.9	+9.9	+33.3
Society E	−25.0	−5.0	+37.5
Society F	−17.9*	+4.2	0
Society G	−50.0	−4.2	+14.3
Society H	0	+21.7	+3.3
Society I	[a]	−27.8	0
Society J	−28.6*	+35.1	+19.9
Society K	+22.2	−1.3	+22.2
Society L	−11.8	+7.6	+17.3
Society M	−10.4	−2.5	+11.1
Society N	+10.7	+8.1	−4.1

*$p < 0.05$, p-value is calculated comparing the difference in proportions between 2011 and 2016.
[a] No panels in 2011, so unable to calculate.

contributions of women.

One limitation of this study was our challenge in applying statistical tests to data on the far-tail of a normal distribution, and also applying statistical tests to data with small numbers, particularly in our plenary speaker category. Despite several statistically negative results, we still feel that gender disparities in speaker roles are important and may not be captured by our statistical tests. Another limitation is the variability in speaker selection processes across societies. In addition, plenary speakers are not necessarily members of surgical societies and may not be surgeons. Our study is also limited by incomplete data, primarily due to lack of membership records from societies. We would encourage all medical societies to collect and store these data in order to track representation over time. Finally, we recognize gender diversity is but one form of diversity that matters. We were unable to examine racial, ethnic, religious, sexual orientation, age, disability, social class, or other forms of diversity as those data were not available to us. Nevertheless, it is crucial to be mindful of all kinds of diversity in order to foster diversity of thought. We also acknowledge that inclusion is even more important than diversity; the promotion of women into speaking roles can be considered a measure of inclusion in the current context. It is especially important to note that the effects of intersectionality (such as being both black and female) are profound and were not assessed in this study.

In summary, our data highlight the variable rates of representation of women in speaking roles at surgical conferences. There are relatively few opportunities for women to be plenary speakers, and there has not been a significant increase in the proportion of women selected to be plenary speakers over the two timepoints that we examined. However, there has been some improvement in the representation of women as session speakers and the number of all-male sessions over time. These data provide some hope that further progress can be made over time. In addition, the association of women on the program committee and in society leadership roles with more women in session speaker roles and fewer all-male panels points to a straight-forward strategy that societies can implement to move toward gender equity in the short-term. Societies should also be mindful of other kinds of diversity, including racial, ethnic, religious, sexual orientation, and social class as they endeavor to become more inclusive. As with any other endeavor, societies that want to foster diversity and inclusion should monitor their efforts and outcomes over time.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.amjsurg.2019.09.004.

References

1. Sheridan JT, Fine E, Pribbenow CM, Handelsman J, Carnes M. Searching for excellence & diversity: increasing the hiring of women faculty at one academic medical center. *Acad Med*. 2010;85(6):999–1007. https://doi.org/10.1097/ACM.0b013e3181dbf75a.
2. Valantine H, Sandborg CI. Changing the culture of academic medicine to eliminate the gender leadership gap. *Acad Med*. 2013;88(10):1411–1413. https://doi.org/10.1097/ACM.0b013e3182a34952.
3. AAMC. *Table 1: Medical Students, Selected Years*; 2016, 1965-2015 https://www.aamc.org/download/481178/data/2015table1.pdf. Accessed September 29, 2018.
4. AAMC. *ACGME Residents and Fellows by Sex and Specialty*; 2015, 2016 https://www.aamc.org/data/workforce/reports/458766/2-2-chart.html. Accessed September 29, 2018.
5. AAMC. *Active Physicians by Sex and Specialty*; 2015, 2015 https://www.aamc.org/data/workforce/reports/458712/1-3-chart.html. Accessed September 29, 2018.
6. AAMC. *Distribution of Full-Time Faculty by Department, Rank, and Gender*; 2015, 2016 https://www.aamc.org/download/481182/data/2015table3.pdf. Accessed April 22, 2018.
7. Sexton KW, Hocking KM, Wise E, et al. Women in academic surgery: the pipeline is busted. *J Surg Educ*. 2012;69(1):84–90. https://doi.org/10.1016/j.jsurg.2011.07.008.
8. Washington University School of Medicine. *Washington University School of Medicine Appointments & Promotions Guidelines and Requirements*; 2014. https://biochem.wustl.edu/data/pdfs/forms_info/APGAR.pdf. Accessed September 29, 2018.
9. Klein RS, Voskuhl R, Segal BM, et al. Speaking out about gender imbalance in invited speakers improves diversity. *Nat Immunol*. 2017;18(5):475–478. https://doi.org/10.1038/ni.3707.
10. Carley S, Carden R, Riley R, et al. Are there too few women presenting at emergency medicine conferences? *Emerg Med J*. 2016;33(10):681–683. https://doi.org/10.1136/emermed-2015-205581.
11. Shishkova E, Kwiecien NW, Hebert AS, Westphall MS, Prenni JE, Coon JJ. Gender diversity in a STEM subfield – analysis of a large scientific society and its annual conferences. *J Am Soc Mass Spectrom*. 2017;28(12):2523–2531. https://doi.org/10.1007/s13361-017-1803-z.
12. Schroeder J, Dugdale HL, Radersma R, et al. Fewer invited talks by women in evolutionary biology symposia. *J Evol Biol*. 2013;26(9):2063–2069. https://doi.org/10.1111/jeb.12198.
13. BiasWatchArchaeo. BiasWatchArchaeo.. http://www.biaswatcharchaeo.com/. Accessed September 29, 2018.
14. BiasWatchNeuro. BiasWatchNeuro.. https://biaswatchneuro.com/. Accessed September 29, 2018.
15. Sarma S. Congrats, you have an all male panel!. http://allmalepanels.tumblr.com/. Accessed September 29, 2018.
16. Prasad A. Conference Diversity Distribution Calculator. http://aanandprasad.com/diversity-calculator/?groupName=women&numSpeakers=20&populationPercentage=20. Accessed September 29, 2018.
17. For Gender Equity Team. Petition: commitment to gender equity at scholarly conferences. https://www.gopetition.com/petitions/commitment-to-gender-equity-at-scholarly-conferences.html. Accessed September 29, 2018.
18. Carter E, Gagliardi L, Krylov A. Stop gender discrimination in science. https://www.change.org/p/scientific-community-stop-gender-discrimination-in-science.
19. Al-Gazali L, Valian V, Barres B, et al. Scientists of the world speak up for equality. *Nature*. 2013;495(7439):35–38. https://doi.org/10.1038/495035a.
20. Dalley B, Podawiltz A, Castro R, et al. The joint admission medical program: a statewide approach to expanding medical education and career opportunities for disadvantaged students. *Acad Med*. 2009;84(10):1373–1382. https://doi.org/10.1097/ACM.0b013e3181b6c76b.
21. Goins G, Chen M, White C, Clemence D, Redd T, Kelkar V. An initiative to broaden diversity in undergraduate biomathematics training. *CBE-Life Sci Educ*. 2010;9(3):241–247. https://doi.org/10.1187/cbe.10-03-0043.
22. Rodríguez JE, Campbell KM, Mouratidis RW. Where are the rest of us? Improving representation of minority faculty in academic medicine. *South Med J*. 2014;107(12):739–744. https://doi.org/10.14423/SMJ.0000000000000204.
23. Silver JK, Bhatnagar S, Blauwet CA, et al. Female physicians are underrepresented in recognition awards from the American Academy of physical medicine and rehabilitation. *PM&R*. 2017;9(10):976–984. https://doi.org/10.1016/j.pmrj.2017.02.016.
24. Association of Academic Physiatrists. *AAP Annual Meeting 2018 Full Schedule. Physiatry '18*; 2018. Published https://www.eventscribe.com/2018/AAP/agenda.asp?h=Full_Schedule&BCFO=P. Accessed September 29, 2018.
25. Martin JL. Ten simple rules to achieve conference speaker gender balance. Bourne PE. *PLoS Comput Biol*. 2014;10(11). https://doi.org/10.1371/journal.-pcbi.1003903. e1003903.
26. Silver JK, Slocum CS, Bank AM, et al. Where are the women? The underrepresentation of women physicians among recognition award recipients from medical specialty societies. *PM&R*. 2017;9(8):804–815. https://doi.org/10.1016/j.pmrj.2017.06.001.
27. Patton EW, Griffith KA, Jones RD, Stewart A, Ubel PA, Jagsi R. Differences in mentor-mentee sponsorship in male vs female recipients of national institutes of health grants. *JAMA Intern Med*. 2017;177(4):580–582. https://doi.org/10.1001/jamainternmed.2016.9391.
28. Huntington WP, Haines N, Patt JC. What factors influence applicants' rankings of orthopaedic surgery residency programs in the National Resident Matching Program? *Clin Orthop Relat Res*. 2014;472(9):2859–2866. https://doi.org/10.1007/s11999-014-3692-9.
29. Straus SE, Straus C, Tzanetos K. International Campaign to Revitalise Academic Medicine under the auspices of the IC to RA. Career choice in academic medicine: systematic review. *J Gen Intern Med*. 2006;21(12):1222–1229. https://doi.org/10.1111/j.1525-1497.2006.00599.x.
30. Casadevall A, Handelsman J. The presence of female conveners correlates with a higher proportion of female speakers at scientific symposia. *mBio*. 2014;5(1). https://doi.org/10.1128/mBio.00846-13. e00846-13.
31. Isbell LA, Young TP, Harcourt AH. Stag parties linger: continued gender bias in a female-rich scientific disciplineLambert JE, ed. *PLoS One*. 2012;7(11):e49682. https://doi.org/10.1371/journal.pone.0049682.